

# **South Coast Air Quality Management District**



## **Supplemental Instructions**

### **Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory**

#### **Annual Emissions Reporting Program**

**January 2010**

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## Background

Under the Air Toxics “Hot Spots” Information and Assessment Act of 1987 (AB2588 Program), facilities are required to provide an update of their toxics emissions inventory to the District on a quadrennial basis (or once every four years). Up until June 2001, the reporting requirement was implemented through the Hot Spots Program, which was separate from reporting of criteria and toxic pollutants under the AER Program. Beginning with the FY 2000-01 reporting cycle, toxics emission reporting for the AB2588 Program was incorporated into the AQMD's AER Program. Currently, there are approximately 500 AB2588 facilities which are grouped into four phases for reporting purposes (i.e., Phase 1A, 1B, 2, and 3). And each phase reports once over a quadrennial (four year) cycle. Toxic inventories were based on fiscal year (i.e., July 1 through June 30) from 2000 to 2007 and are based on calendar year (i.e., January 1 through December 31) starting with reporting year 2008.

In addition to the toxics emissions reported by AB2588 facilities, facilities emitting any of the 24 toxic air contaminants (TAC) or ozone depleting compounds (ODC) specified in District’s Rule 301(e) are also required to report these emissions annually to the District under the Annual Emissions Report (AER) Program and pay the corresponding emission fees. The list of compounds and are given in Table 1. Their corresponding emission fees may be found in Rule 301, Table IV: <http://www.aqmd.gov/rules/reg/reg03/r301.pdf>.

**Table 1.** Rule 301(e) Toxic Air Contaminants and Ozone Depleters.

<b>Toxic Compound</b>
Ammonia
Asbestos*
Benzene
Cadmium*
Carbon tetrachloride
Chlorinated dioxins and dibenzofurans
Ethylene dibromide
Ethylene dichloride
Ethylene oxide
Formaldehyde
Hexavalent chromium*
Methylene chloride
Nickel*
Perchloroethylene
1,3 Butadiene
Inorganic arsenic*
Beryllium*
Polynuclear aromatic hydrocarbons (PAHs)
Vinyl chloride
Lead*
1,4-Dioxane
Trichloroethylene
Chlorofluorocarbons (CFCs)**
1,1,1-Trichloroethane**

\* Particulate toxic air contaminant

\*\* Ozone depleting compound

Every year, one phase (out of the four phases) is required to submit their complete quadrennial toxics emission inventory to the District. The reporting facilities will be prioritized from the information in their quadrennial inventory and facilities with a priority score<sup>1</sup> greater than ten (10) may be required to prepare a health risk assessment (HRA) using the “Hot Spots” Analysis and Reporting Program (HARP).<sup>2</sup> (A facility that has previously prepared a HRA that reflects the actual risks associated with the facility may not be required to prepare a new HRA.) The first step a facility takes when preparing their HRA using HARP will be to input facility information including a detailed toxics emission inventory by device along with source parameter and location information. Facilities will have to re-enter much of their toxic emissions through HARP, but that is necessary in order to prepare the HRA. There is currently no mechanism to upload AER data into HARP.

## Reporting Procedures for AB2588 Facilities

The following is a summary of procedures for AB2588 facilities for reporting their quadrennial toxics emissions inventory to the District:

- Reporting of toxic emissions is performed under the District’s AER Program.
- The reporting cycle is based on calendar year (CY) (i.e., January 1 to December 31) to be consistent with the AER Program. Accordingly, the new schedule for toxic inventory reports for each phase is as follows: Phase 1A – FY 2006/2007, Phase 1B – CY 2008, Phase 2 – CY 2009, and Phase 3 – CY 2010. And thereafter, each phase takes a turn at reporting once every subsequent four year cycle: Phase 1A – CY 2011, Phase 1B – CY 2012, and so on.
- Streamlined AB2588 reporting process:
  - For a list of applicable toxics (177 substances), refer to Appendix A.
  - Beginning with the 2008 reporting cycle, the AQMD provides a web-based tool for facilities to use for preparing the annual emission reports. The new web-based reporting system consolidates criteria, toxics, and optional greenhouse gases (GHG) reporting.
  - The web-based tool (AER-Web) is the only acceptable means of reporting criteria, toxics, and optional GHG emissions.
  - AER-Web will automatically identify if your facility is in the AB2588 Program and subject to a quadrennial update, as illustrated on the top of the next page.
  - Facilities will report their toxic emissions based on the emission categories identified in AER-Web.
  - Stack parameters and operating profile by equipment do not need to be reported. The District, however, may request this information at a later time, if necessary.

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<sup>1</sup> Priority score is a facility’s position on a scale representing potential health risks. The priority score is determined by an algorithm that considers potency, toxicity, quantity, and volume of hazardous material released from the facility; and the proximity of the facility to potential receptors. The District’s prioritization procedures are available at: <http://www.aqmd.gov/prdas/AB2588/AB2588.html>.

<sup>2</sup> HARP is a single integrated analysis tool that streamlines the emission inventory and risk assessment requirements of the AB2588 Program.

South Coast Air Quality Management District

Form Data Entry Form Selection Submission Review Forms & Reports Manage Users

FAC

B Forms

- B1
- B1U
- B2
- B2U
- B4
- B4U

TAC Forms

- TAC
- TACS

Summary

- A
- C
- CU
- CR
- S
- WT

X - Signature Sheet

Information

Facility ID# 346

AB2588 Filing Period ☒

AB2588 Receptor Distance

NAICS Code 31192

RECLAIM ☒

Worker(ft)

Reporting Year 2008

Residential (ft)

Company Name NKW ENTERPRISES

Street # 555

Direction South

Street Name Main

Suffix Street

City

State

Zip

- AB2588 facilities are also required to report the corresponding criteria pollutant emissions on the applicable forms and pay corresponding emissions fees if they exceed the thresholds. As specified in District's Rule 301(e), facilities emitting 4 tons or more of reactive organic gases (ROG), oxides of nitrogen (NO<sub>x</sub>), oxides of sulfur (SO<sub>x</sub>), specific organics (SPOG), and particulate matter (PM) or emitting 100 tons or more of carbon monoxide (CO) are required to pay emission fees based on the total weight of emissions.
- During the sixty (60) days allowed for filing the report, the District will conduct public outreach through informational workshops and public assistance through telephone hotline, fax, e-mail, and Internet to assist facilities in filing their reports. Individual appointments may be arranged upon request. Users are referred to the on-line Help for the available program support.
- The toxics emissions data submitted by facilities will be used for determining whether a health risk assessment needs to be conducted or an existing one to be revised.
- The District maintains the right to review and audit the reported data and request additional data for clarification, if necessary.
- Please refer to the on-line Help for more detailed program updates, software instructions, what to submit, frequently asked questions, and other helpful program information.

## Recommendations

- Read the instructions under **Help & Support**.
- Attend one or more of the workshops in January.
- Take advantage of any or all of the program support listed in the on-line Help.

- In Appendices B, C, D and E, we provide default emission factors for internal and external fuel combustion, plating operations, spray booth coating operations, and asbestos abatement respectively. The provided emission factors are conservative and therefore may overestimate emissions. So if any of your facility's equipment has district-approved source test results, these should be used for emission calculation.

## **Worker and Residential Receptor Distances**

Receptor locations are off-site locations where persons may be exposed to toxic emissions from equipment. Residential receptor locations include current residential land uses and areas that may be developed for residential uses in the future, given land use trends in the general area. Commercial receptor locations include areas zoned for manufacturing, light or heavy industry, retail activity, or locations that are regular work sites.

Worker Receptor Distance – Closest distance between any source of air toxic emissions at your facility and the property boundary of any one of the following receptors: other business or work-site, shopping center, or any other commercial site.

Residential Receptor Distance - Closest distance between any source of air toxic emissions at your facility and the property boundary of any one of the following receptors: house, apartment, convalescent home, trailer park, or other residence.

If you are an AB2588 facility that is filing a quadrennial toxic emission inventory, list your closest worker and residential receptor distance on Form X.

## **Appendix A - List of Toxic Substances, the Reporting Thresholds and Special Instructions for Reporting Select TACs**

Table A-1 contains the list of compounds to be reported by AB2588 facilities preparing their quadrennial emissions inventory under the AER Program. The table provides the compound name, its TAC code and CAS number, and the degree of accuracy for each toxic. The table is alphabetically sorted by name. Multiple compounds within a TAC code group are listed in alphabetical order and shown in italics. The degree of accuracy is nothing more than a de minimis emission level for reporting. As a result, facility-wide emissions of toxics greater than one-half of their corresponding degree of accuracy must be inventoried and reported. Conversely, total facility toxic emissions less than one-half of the degree of accuracy do not need to be reported for TAC Codes 24 through 31 and 33 through 73.

Also shown in the table is whether the substance is a VOC, a component of particulate matter (PM), or a toxic air contaminant (TAC) and/or ozone depleting compound (ODC). This information should be used when estimating the VOC and PM emissions. As stated earlier, AB2588 facilities are required to report the corresponding criteria pollutant emissions on the applicable forms and pay corresponding emission fees if they exceed the thresholds.

Table A-1 lists the family name and the individual species within the family for the following toxic air contaminants (TACs):

- Chlorinated dioxins and dibenzofurans (TAC code #7)
- Fluorocarbons (chlorinated) (TAC code #22)
- Glycol ethers and their acetates (TAC code #41)
- Hexachlorocyclohexanes (TAC code #43)
- Isocyanates and diisocyanates (TAC code #48)
- Mercury and mercury compounds (TAC code #50)
- PAHs (TAC code #19)
- Phosphorous compounds (TAC code #60)
- POMS and PAH-derivatives (TAC code #61)
- Selenium and compounds (TAC code #64)
- Sulfuric acid and oleum (TAC code #67)
- Xylenes (TAC code #70)

It is important when reporting emissions for these families of compounds that emissions are not double-counted thus adversely affecting the facility's emissions and/or fees. Emissions reported for the overall family and each of the species within the family are summed for the purpose of calculating total facility emissions and/or assigning fees and prioritizing facility risks. Therefore, it is important that you either report emissions by individual species or overall emissions for the toxic family. You must report emissions by individual species whenever that information is known. Only report emissions as a group total if the individual species emissions are unknown. Table A-2 considers each toxic family and several other toxics such as, arsenic (CAS #7440382), asbestos (CAS #1332214), hexavalent chromium (CAS #18540299), lead (CAS #7439921), and nickel (CAS #7440020), and provides recommendations for emissions reporting. All TAC emissions must be reported on form TAC. It is important that the directions provided in Table A-2 be read carefully before calculating TAC emissions.

**Table A-1. DeMinimis Reporting Limits for Toxics**

TAC Code	CAS Number	Substance	Type of TAC/ODC	Degree of Accuracy (lbs/yr)
29	75070	Acetaldehyde	TAC and VOC	20
30	107028	Acrolein	TAC and VOC	0.05
31	107131	Acrylonitrile	TAC and VOC	0.1
32	7664417	Ammonia	TAC only	200
14	7440382	Arsenic and Compounds (inorganic)	TAC and PM	0.01
1	1332214	Asbestos	TAC and PM	0.0001
2	71432	Benzene	TAC and VOC	2
3	7440417	Beryllium	TAC and PM	0.001
4	106990	Butadiene [1,3]	TAC and VOC	0.1
5	7440439	Cadmium	TAC and PM	0.01
6	56235	Carbon tetrachloride	TAC and VOC	1
33	463581	Carbonyl sulfide	TAC only	100
34	7782505	Chlorine	TAC only	0.5
35	67663	Chloroform	TAC and VOC	10
13	18540299	Chromium, hexavalent (and compounds)	TAC and PM	0.0001
36	7440508	Copper	TAC and PM	0.1
37	7631869	Crystalline silica	TAC and PM	0.1
38	117817	Di(2-ethylhexyl) phthalate {DEHP}	TAC and VOC	20
7	1080	Chlorinated dioxins and dibenzofurans	TAC and VOC	0.00002
	67562394	1,2,3,4,6,7,8-Heptachlorodibenzofuran [POM]	TAC and VOC	0.000001
	55673897	1,2,3,4,7,8,9-Heptachlorodibenzofuran [POM]	TAC and VOC	0.000001
	35822469	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin [POM]	TAC and VOC	0.000001
	70648269	1,2,3,4,7,8-Hexachlorodibenzofuran [POM]	TAC and VOC	0.000001
	57117449	1,2,3,6,7,8-Hexachlorodibenzofuran [POM]	TAC and VOC	0.000001
	72918219	1,2,3,7,8,9-Hexachlorodibenzofuran [POM]	TAC and VOC	0.000001
	60851345	2,3,4,6,7,8-Hexachlorodibenzofuran [POM]	TAC and VOC	0.000001
	39227286	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin [POM]	TAC and VOC	0.000001
	57653857	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin [POM]	TAC and VOC	0.000001
	19408743	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin [POM]	TAC and VOC	0.000001
	39001020	1,2,3,4,5,6,7,8-Octachlorodibenzofuran [POM]	TAC and VOC	0.000001
	3268879	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin [POM]	TAC and VOC	0.000001
	57117416	1,2,3,7,8-Pentachlorodibenzofuran [POM]	TAC and VOC	0.000001
	57117314	2,3,4,7,8-Pentachlorodibenzofuran [POM]	TAC and VOC	0.000001
	40321764	1,2,3,7,8-Pentachlorodibenzo-p-dioxin [POM]	TAC and VOC	0.000001
	51207319	2,3,7,8-Tetrachlorodibenzofuran [POM]	TAC and VOC	0.000001
	1746016	2,3,7,8-Tetrachlorodibenzo-p-dioxin {TCDD} [POM]	TAC and VOC	0.000001
27	78875	1,2-Dichloropropane {Propylene dichloride}	TAC and VOC	20
28	542756	1,3-Dichloropropene	TAC and VOC	10
72	9901	Diesel exhaust particulates	TAC and PM	10
39	131113	Dimethyl phthalate	TAC and VOC	50
8	123911	1,4-Dioxane	TAC and VOC	5
40	100414	Ethyl benzene	TAC and VOC	200
9	106934	Ethylene dibromide {1,2-Dibromoethane}	TAC and VOC	0.5
10	107062	Ethylene dichloride {1,2-Dichloroethane}	TAC and VOC	2
11	75218	Ethylene oxide	TAC and VOC	0.5

(continued)



**Table A-1. (continued)**

TAC Code	CAS Number	Substance	Type of TAC/ODC	Degree of Accuracy (lbs/yr)
22	1104	Fluorocarbons (chlorinated)	TAC, ODC	1
	76131	<i>Trichlorotrifluoroethane {CFC-113}</i>	TAC, ODC	1
	75434	<i>Dichlorofluoromethane {Freon 12}</i>	TAC, ODC	1
	75694	<i>Trichlorofluoromethane {Freon 11}</i>	TAC, ODC	1
12	50000	Formaldehyde	TAC and VOC	5
41	1115	Glycol ethers and their acetates	TAC and VOC	100
	111466	<i>Diethylene glycol</i>	TAC and VOC	100
	111966	<i>Diethylene glycol dimethyl ether</i>	TAC and VOC	100
	112345	<i>Diethylene glycol monobutyl ether</i>	TAC and VOC	100
	111900	<i>Diethylene glycol monoethyl ether</i>	TAC and VOC	100
	111773	<i>Diethylene glycol monomethyl ether</i>	TAC and VOC	100
	25265718	<i>Dipropylene glycol</i>	TAC and VOC	100
	34590948	<i>Dipropylene glycol monomethyl ether</i>	TAC and VOC	100
	629141	<i>Ethylene glycol diethyl ether</i>	TAC and VOC	100
	110714	<i>Ethylene glycol dimethyl ether</i>	TAC and VOC	100
	111762	<i>Ethylene glycol monobutyl ether</i>	TAC and VOC	200
	110805	<i>Ethylene glycol monoethyl ether</i>	TAC and VOC	50
	111159	<i>Ethylene glycol monoethyl ether acetate</i>	TAC and VOC	100
	109864	<i>Ethylene glycol monomethyl ether</i>	TAC and VOC	10
	110496	<i>Ethylene glycol monomethyl ether acetate</i>	TAC and VOC	200
	2807309	<i>Ethylene glycol monopropyl ether</i>	TAC and VOC	100
	107982	<i>Propylene glycol monomethyl ether</i>	TAC and VOC	200
	108656	<i>Propylene glycol monomethyl ether acetate</i>	TAC and VOC	100
	112492	<i>Triethylene glycol dimethyl ether</i>	TAC and VOC	100
42	118741	Hexachlorobenzene	TAC and VOC	0.1
43	608731	Hexachlorocyclohexanes	TAC and VOC	0.1
	319846	<i>alpha-Hexachlorocyclohexane</i>	TAC and VOC	0.1
	319857	<i>beta-Hexachlorocyclohexane</i>	TAC and VOC	0.1
	58899	<i>Lindane {gamma-Hexachlorocyclohexane}</i>	TAC and VOC	0.1
44	110543	Hexane	TAC and VOC	200
45	302012	Hydrazine	TAC only	0.01
46	7647010	Hydrochloric acid	TAC and PM	20
73	7664393	Hydrogen fluoride (hydrofluoric acid)	TAC and PM	20
47	7783064	Hydrogen sulfide	TAC only	5
48	1125	Isocyanates and diisocyanates	TAC and VOC	0.05
	822060	<i>Hexamethylene-1,6-diisocyanate</i>	TAC and VOC	0.05
	624839	<i>Methyl isocyanate</i>	TAC and VOC	1
	101688	<i>Methylene diphenyl diisocyanate {MDI} [POM]</i>	TAC and VOC	0.1
	1204	<i>Toluene diisocyanates</i>	TAC and VOC	0.1
	584849	<i>Toluene-2,4-diisocyanate</i>	TAC and VOC	0.1
	91087	<i>Toluene-2,6-diisocyanate</i>	TAC and VOC	0.1
15	7439921	Lead compounds (inorganic)	TAC and PM	0.5
49	7439965	Manganese	TAC and PM	0.1

(continued)

**Table A-1. (continued)**

TAC Code	CAS Number	Substance	Type of TAC/ODC	Degree of Accuracy (lbs/yr)
<b>50</b>	7487947	Mercury and mercury compounds	TAC and PM	
		<i>Mercuric chloride</i>	TAC and PM	1
	7439976	<i>Mercury</i>	TAC and PM	1
	593748	<i>Methyl mercury {Dimethylmercury}</i>	TAC and PM	1
<b>51</b>	67561	Methanol	TAC and VOC	200
<b>52</b>	74873	Methyl chloride {Chloromethane}	TAC and VOC	20
<b>23</b>	71556	Methyl chloroform {1,1,1-Trichloroethane}	TAC, ODC	1
<b>53</b>	78933	Methyl ethyl ketone {2-Butanone}	TAC and VOC	200
<b>54</b>	108101	Methyl isobutyl ketone {Hexone}	TAC and VOC	20
<b>55</b>	1634044	Methyl tert-butyl ether	TAC and VOC	200
<b>16</b>	75092	Methylene chloride {Dichloromethane}	TAC only	50
<b>17</b>	7440020	Nickel	TAC and PM	0.1
<b>57</b>	106467	p-Dichlorobenzene {1,4-Dichlorobenzene}	TAC and VOC	5
<b>19</b>	1151	PAHs, total, w/o individ. components reported [PAH, POM]	TAC and VOC	0.2
	83329	<i>Acenaphthene [PAH, POM]</i>	TAC and VOC	1
	208968	<i>Acenaphthylene [PAH, POM]</i>	TAC and VOC	1
	120127	<i>Anthracene [PAH, POM]</i>	TAC and VOC	1
	56553	<i>Benz[a]anthracene [PAH, POM]</i>	TAC and VOC	0.5
	50328	<i>Benzo[a]pyrene [PAH, POM]</i>	TAC and VOC	0.05
	205992	<i>Benzo[b]fluoranthene [PAH, POM]</i>	TAC and VOC	0.5
	192972	<i>Benzo[e]pyrene [PAH, POM]</i>	TAC and VOC	0.5
	191242	<i>Benzo[g,h,i]perylene [PAH, POM]</i>	TAC and VOC	0.5
	205823	<i>Benzo[j]fluoranthene [PAH, POM]</i>	TAC and VOC	0.5
	207089	<i>Benzo[k]fluoranthene [PAH, POM]</i>	TAC and VOC	0.5
	218019	<i>Chrysene [PAH, POM]</i>	TAC and VOC	1
	53703	<i>Dibenz[a,h]anthracene [PAH, POM]</i>	TAC and VOC	0.1
	192654	<i>Dibenzo[a,e]pyrene [PAH, POM]</i>	TAC and VOC	0.05
	189640	<i>Dibenzo[a,h]pyrene [PAH, POM]</i>	TAC and VOC	0.001
	189559	<i>Dibenzo[a,i]pyrene [PAH, POM]</i>	TAC and VOC	0.001
	191300	<i>Dibenzo[a,l]pyrene [PAH, POM]</i>	TAC and VOC	0.001
	206440	<i>Fluoranthene [PAH, POM]</i>	TAC and VOC	0.5
	86737	<i>Fluorene [PAH, POM]</i>	TAC and VOC	0.5
	193395	<i>Indeno[1,2,3-cd]pyrene [PAH, POM]</i>	TAC and VOC	0.5
	91576	<i>2-Methyl naphthalene [PAH, POM]</i>	TAC and VOC	1
	91203	<i>Naphthalene [PAH, POM]</i>	TAC and VOC	1
	198550	<i>Perylene [PAH, POM]</i>	TAC and VOC	0.5
	85018	<i>Phenanthrene [PAH, POM]</i>	TAC and VOC	0.5
	129000	<i>Pyrene [PAH, POM]</i>	TAC and VOC	0.5
<b>56</b>	1336363	PCBs (Polychlorinated biphenyls) [POM]	TAC and VOC	0.01
<b>58</b>	87865	Pentachlorophenol	TAC and VOC	10
<b>18</b>	127184	Perchloroethylene {Tetrachloroethene}	TAC only	5
<b>59</b>	7723140	Phosphorus	TAC and PM	0.1

(continued)

Reporting Procedures for AB2588 Facilities Reporting their Quadrennial Air Toxic Emission Inventory in  
the Annual Emission Reporting Program

**Table A-1. (concluded)**

TAC Code	CAS Number	Substance	Type of TAC/ODC	Degree of Accuracy (lbs/yr)
<b>60</b>	7803512	Phosphorous compounds <i>Phosphine</i>	TAC and PM	0.01
	7664382	<i>Phosphoric acid</i>	TAC and PM	50
	10025873	<i>Phosphorus oxychloride</i>	TAC and PM	0.1
	10026138	<i>Phosphorus pentachloride</i>	TAC and PM	0.1
	1314563	<i>Phosphorus pentoxide</i>	TAC and PM	0.1
	7719122	<i>Phosphorus trichloride</i>	TAC and PM	0.1
	126738	<i>Tributyl phosphate</i>	TAC and PM	100
	78400	<i>Triethyl phosphine</i>	TAC and PM	100
	512561	<i>Trimethyl phosphate</i>	TAC and PM	100
	78308	<i>Triorthocresyl phosphate [POM]</i>	TAC and PM	0.5
	115866	<i>Triphenyl phosphate [POM]</i>	TAC and PM	100
	101020	<i>Triphenyl phosphite [POM]</i>	TAC and PM	100
<b>61</b>	226368	POMS and PAH-derivatives <i>Dibenz[a,h]acridine [POM]</i>	TAC and VOC	0.5
	224420	<i>Dibenz[a,j]acridine [POM]</i>	TAC and VOC	0.5
	194592	<i>7H-Dibenzo[c,g]carbazole</i>	TAC and VOC	0.05
	57976	<i>7,12-Dimethylbenz[a]anthracene [PAH-Derivative, POM]</i>	TAC and VOC	0.0001
	42397648	<i>1,6-Dinitropyrene [PAH-Derivative, POM]</i>	TAC and VOC	0.001
	42397659	<i>1,8-Dinitropyrene [PAH-Derivative, POM]</i>	TAC and VOC	0.05
	56495	<i>3-Methylcholanthrene [PAH-Derivative, POM]</i>	TAC and VOC	0.001
	3697243	<i>5-Methylchrysene [PAH-Derivative, POM]</i>	TAC and VOC	0.05
	101779	<i>4,4'-Methylenedianiline (and its dichloride) [POM]</i>	TAC and VOC	0.1
	602879	<i>5-Nitroacenaphthene [POM]</i>	TAC and VOC	1
	7496028	<i>6-Nitrochrysene [PAH-Derivative, POM]</i>	TAC and VOC	0.001
	607578	<i>2-Nitrofluorene [PAH-Derivative, POM]</i>	TAC and VOC	5
	5522430	<i>1-Nitropyrene [PAH-Derivative, POM]</i>	TAC and VOC	0.5
	57835924	<i>4-Nitropyrene [POM]</i>	TAC and VOC	1
<b>62</b>	75569	Propylene oxide	TAC and VOC	10
<b>63</b>	91225	Quinoline	TAC and VOC	100
<b>64</b>	7783075	Selenium and compounds <i>Hydrogen selenide</i>	TAC and PM	0.5
	7782492	<i>Selenium</i>	TAC and PM	0.5
	7446346	<i>Selenium sulfide</i>	TAC and PM	0.5
<b>65</b>	1310732	Sodium hydroxide	TAC and PM	2
<b>66</b>	100425	Styrene	TAC and VOC	100
<b>24</b>	79345	1,1,2,2-Tetrachloroethane	TAC and VOC	1
<b>67</b>	8014957	Sulfuric acid and oleum <i>Oleum</i>	TAC and PM	2
	7664939	<i>Sulfuric acid</i>	TAC and PM	2
	7446719	<i>Sulfur trioxide</i>	TAC and PM	2
<b>68</b>	108883	Toluene	TAC and VOC	200
<b>25</b>	79005	1,1,2-Trichloroethane {Vinyl trichloride}	TAC and VOC	50
<b>20</b>	79016	Trichloroethylene	TAC and VOC	20
<b>26</b>	95636	1,2,4-Trimethylbenzene	TAC and VOC	5
<b>69</b>	51796	Urethane {Ethyl carbamate}	TAC and VOC	0.1
<b>21</b>	75014	Vinyl chloride	TAC and VOC	0.5
<b>70</b>	1330207	Xylenes	TAC and VOC	200
	108383	<i>m-Xylene</i>	TAC and VOC	200
	95476	<i>o-Xylene</i>	TAC and VOC	200
	106423	<i>p-Xylene</i>	TAC and VOC	200
<b>71</b>	75456	Chlorodifluoromethane {Freon 22}	TAC and SPOG	200

**Table A-2. Special Instructions for Reporting Select TACs**

<b>TAC code</b>	<b>Substance</b>	<b>Reporting recommendations</b>
<b>14</b>	Arsenic and compounds	Be sure to consider the inorganic arsenic weight fraction in inorganic arsenic containing materials such as arsine when calculating the inorganic arsenic emissions. The arsenic weight fraction for arsine (CAS# 784421) is 0.9612.
<b>1</b>	Asbestos	Be sure to consider the asbestos weight fraction in mineral fibers such as erionite, talc, etc. when calculating the asbestos emissions.
<b>13</b>	Hexavalent chromium and compounds	Be sure to consider the hexavalent chromium weight fraction in coating materials such as barium chromate, calcium chromate, lead chromate, sodium chromate, strontium chromate, and chromium trioxide (as chromic acid mist) when calculating the hexavalent chromium emissions. The hexavalent chromium weight fractions for these compounds are as follows: barium chromate (CAS# 10294403) – 0.2053; calcium chromate (CAS# 13765190 – 0.3332; lead chromate (CAS# 7758976) – 0.1609; sodium dichromate (CAS# 10588019) – 0.397; strontium chromate (CAS# 7789062) – 0.2554; chromium trioxide (as chromic acid mist) (CAS# 1333820) – 0.52; zinc chromate (CAS # 13530659) – 0.2867.
<b>7</b>	Chlorinated dioxins and dibenzofurans	Report emissions by individual species whenever that information is available. Only report emissions as a group total if the individual species emissions are unknown. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together on form TACS to calculate the family total emissions.
<b>22</b>	Fluorocarbons (chlorinated)	Report emissions by individual species whenever that information is available. Only report emissions as a group total if the individual species emissions are unknown. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together on form TACS to calculate the family total emissions.
<b>41</b>	Glycol ethers and their acetates	Report emissions by individual species whenever that information is available. Only report emissions as a group total if the individual species emissions are unknown. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.
<b>43</b>	Hexachlorocyclohexanes	Report emissions by individual species whenever that information is available. Only report emissions as a group total if the individual species emissions are unknown. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.
<b>48</b>	Isocyanates and diisocyanates	Report emissions for each individual isocyanate or diisocyanate compound on form TAC. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.

(Continued)

**Table A-2. (Concluded)**

<b>TAC code</b>	<b>Substance</b>	<b>Reporting recommendations</b>
<b>15</b>	Lead compounds (inorganic)	Be sure to consider the lead weight fraction in lead containing materials such as lead oxide, lead acetate, lead phosphate, lead subacetate, and lead chromate, when calculating the lead emissions. The lead weight fractions for these materials are as follows: lead oxide (CAS# 1314-41-6) – 0.9066; lead acetate (CAS# 301042) – 0.637; lead phosphate (CAS# 7446277) – 0.7659; lead subacetate (CAS# 1335326) – 0.7696; and lead chromate(CAS# 7758976) – 0.6411.
<b>50</b>	Mercury and mercury compounds	Report emissions for each individual mercury compound on form TAC. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.
<b>17</b>	Nickel	Be sure to consider the nickel weight fraction in nickel containing materials such as nickel acetate, nickel carbonate, nickel carbonyl, nickel hydroxide, nickelocene, nickel oxide, nickel subsulfide and refinery dust when calculating the nickel emissions. The nickel weight fractions for these materials are as follows: nickel acetate (CAS# 373024) – 0.3321; nickel carbonate (CAS# 3333673) – 0.4945; nickel carbonyl (CAS# 13463393) – 0.3438; nickel hydroxide (CAS# 12054487) – 0.6332; nickelocene (CAS# 1271289) – 0.4937; nickel oxide (CAS# 1313991) – 0.7859; nickel subsulfide (CAS# 12035722) – 0.2443.
<b>19</b>	PAHs	Report emissions by individual species whenever that information is available. Only report emissions as a group total if the individual species emissions are unknown. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together on form TACS to calculate the family total emissions.
<b>60</b>	Phosphorous compounds	Report emissions for each individual phosphorous compound on form TAC. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.
<b>61</b>	POMs and PAH-derivatives	Report emissions by individual species whenever that information is available. Only report emissions as a group total if the individual species emissions are unknown. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.
<b>64</b>	Selenium and compounds	Report emissions for each individual selenium compound on form TAC. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.
<b>67</b>	Sulfuric acid and oleum	Report emissions for each individual sulfur compound on form TAC. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.
<b>70</b>	Xylenes	Report emissions by individual species whenever that information is available. Only report emissions as a group total if the individual species emissions are unknown. Do not double count the same emissions. Emissions from individual species with the same TAC code are added together to calculate the family total emissions.

## Appendix B - Default Emission Factors for Fuel Combustion

Default Toxic Emission Factors for Form TAC Associated with Combustion Equipment Reported on Forms B1, B1U, B2, B2U, E1, E1U, and R2 are listed below and on the following pages. **If any of your combustion sources has district-approved source tests, use the emission factors developed from the source tests to calculate emissions.**

**Table B-1: DEFAULT EF FOR NATURAL GAS COMBUSTION (LB / MMSCF)**

<b>SOURCE: External Combustion Equipment (Boiler, Oven, Dryer, Furnace, Heater, Afterburner)</b>					
<b>TAC Code</b>	<b>POLLUTANT</b>	<b>CAS NO.</b>	<b>&lt;10 MMBTU/HR</b>	<b>10-100 MMBTU/HR</b>	<b>&gt;100 MMBTU/HR</b>
2	Benzene	71432	0.0080	0.0058	0.0017
12	Formaldehyde	50000	0.0170	0.0123	0.0036
19	Total PAHs (excluding Naphthalene)	1151	0.0001	0.0001	0.0001
19	Naphthalene	91203	0.0003	0.0003	0.0003
29	Acetaldehyde	75070	0.0043	0.0031	0.0009
30	Acrolein	107028	0.0027	0.0027	0.0008
32	Ammonia*	7664417	18.000	18.000	18.000
40	Ethyl benzene	100414	0.0095	0.0069	0.0020
44	Hexane	110543	0.0063	0.0046	0.0013
68	Toluene	108883	0.0366	0.0265	0.0078
70	Xylene	1330207	0.0272	0.0197	0.0058

### SOURCE: Flare, Non-Refinery

<b>TAC Code</b>	<b>POLLUTANT</b>	<b>CAS NO.</b>	<b>ALL SIZES</b>
2	Benzene	71432	0.159
12	Formaldehyde	50000	1.169
19	Total PAHs (excluding Naphthalene)	1151	0.003
19	Naphthalene	91203	0.011
29	Acetaldehyde	75070	0.043
30	Acrolein	107028	0.010
40	Ethyl benzene	100414	1.444
44	Hexane	110543	0.029
68	Toluene	108883	0.058
70	Xylene	1330207	0.029

### SOURCE: Turbine

<b>TAC Code</b>	<b>POLLUTANT</b>	<b>CAS NO.</b>	<b>TURBINE</b>
2	Benzene	71432	0.0122
4	1,3-Butadiene	106990	0.000439
12	Formaldehyde	50000	0.724
19	Naphthalene	91203	0.00133
19	PAHs (excluding Naphthalene)	1151	0.000918
29	Acetaldehyde	75070	0.0408
30	Acrolein	107028	0.00653
32	Ammonia*	7664417	18.000
40	Ethylbenzene	100414	0.0326
62	Propylene oxide	75569	0.0296
68	Toluene	108883	0.133
70	Xylene	1330207	0.0653

\*This value corresponds to equipment with SNCR, for equipment with SCR substitute listed value by 9.1 lbs/mmcsf, and for equipment without SNCR or SCR by 3.2 lbs/mmcsf.

(continued)

**Table B-1: DEFAULT EF FOR NATURAL GAS COMBUSTION (LB / MMSCF) (continued)**

**SOURCE: Stationary and Portable Internal Combustion Engines (ICE)**

TAC Code	POLLUTANT	CAS NO.	2 Stroke-Lean Burn	4 Stroke-Lean Burn	4 Stroke-Rich Burn
2	Benzene	71432	1.98	0.449	1.61
4	1,3-Butadiene	106990	0.836	0.272	0.676
6	Carbon Tetrachloride	56235	0.0619	0.0374	0.0181
9	Ethylene Dibromide	106934	0.0749	0.0452	0.0217
10	1,2-Dichloroethane	107062	0.0430	0.0241	0.0115
12	Formaldehyde	50000	56.3	53.9	20.9
16	Methylene Chloride	75092	0.150	0.0204	0.0420
19	2-Methylnaphthalene	91576	0.0218	0.0339	0
19	Acenaphthene	83329	0.00136	0.00128	0
19	Acenaphthylene	208968	0.00323	0.00564	0
19	Anthracene	120127	0.000732	0	0
19	Benz(a)anthracene	56553	0.000343	0	0
19	Benzo(a)pyrene	50328	0.00000579	0	0
19	Benzo(b)fluoranthene	205992	0.00000868	0.000169	0
19	Benzo(e)pyrene	192972	0.0000239	0.000423	0
19	Benzo(g,h,i)perylene	191242	0.0000253	0.000422	0
19	Benzo(k)fluoranthene	207089	0.00000435	0	0
19	Chrysene	218019	0.000685	0.000707	0
19	Fluoranthene	206440	0.000368	0.00113	0
19	Fluorene	86737	0.00172	0.00578	0
19	Indeno(1,2,3-c,d)pyrene	193395	0.0000101	0	0
19	Naphthalene	91203	0.09823	0.0759	0.0990
19	Perylene	198550	0.00000507	0	0
19	Phenanthrene	85018	0.00360	0.0106	0
19	Pyrene	129000	0.000596	0.00139	0
21	Vinyl Chloride	75014	0.0252	0.0152	0.00732
24	1,1,2,2-Tetrachloroethane	79345	0.0676	0.0408	0.0258
25	1,1,2-Trichloroethane	79005	0.0538	0.0324	0.0156
26	1,2,4-Trimethylbenzene	95636	0.113	0.0146	0
27	1,2-Dichloropropane	78875	0.0455	0.0274	0.0133
28	1,3-Dichloropropene	542756	0.0447	0.0269	0.0130
29	Acetaldehyde	75070	7.92	8.53	2.85
30	Acrolein	107028	7.94	5.24	2.68
32	Ammonia*	7664417	18.000	18.000	18.000
35	Chloroform	67663	0.0480	0.0291	0.0140
40	Ethylbenzene	100414	0.110	0.0405	0.0253
44	n-Hexane	110543	0.454	1.13	0
51	Methanol	67561	2.53	2.55	3.12
66	Styrene	100425	0.0559	0.0241	0.0121
68	Toluene	108883	0.982	0.416	0.569
70	Xylene	1330207	0.273	0.188	0.199

\*This value corresponds to equipment with SNCR, for equipment with SCR substitute listed value by 9.1lbs/mmescf, and for equipment without SNCR or SCR by 3.2 lbs/mmescf.

**Table B-2: DEFAULT EF FOR DIESEL / DISTILLATE OIL FUEL COMBUSTION (LB / 1000 GAL)**

**SOURCE: External Combustion Equipment (Boiler, Oven, Dryer, Furnace, Heater, Afterburner)**

TAC			
Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.0044
4	1,3-Butadiene	106990	0.0148
5	Cadmium	7440439	0.0015
12	Formaldehyde	50000	0.3506
13	Hexavalent chromium	18540299	0.0001
14	Arsenic	7440382	0.0016
15	Lead	7439921	0.0083
17	Nickel	7440020	0.0039
19	Total PAHs (excluding Naphthalene)	1151	0.0445
19	Naphthalene	91203	0.0053
29	Acetaldehyde	75070	0.3506
30	Acrolein	107028	0.3506
32	Ammonia*	7664417	2.9000
36	Copper	7440508	0.0041
40	Ethyl Benzene	100414	0.0002
44	Hexane	110543	0.0035
46	Hydrogen chloride	7647010	0.1863
49	Manganese	7439965	0.0031
50	Mercury	7439976	0.0020
64	Selenium	7782492	0.0022
68	Toluene	108883	0.0044
70	Xylenes	1330207	0.0016

**SOURCE: Stationary and Portable  
Internal Combustion Engines (ICE)**

TAC			
Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.1863
4	1,3-Butadiene	106990	0.2174
5	Cadmium	7440439	0.0015
12	Formaldehyde	50000	1.7261
13	Hexavalent chromium	18540299	0.0001
14	Arsenic	7440382	0.0016
15	Lead	7439921	0.0083
17	Nickel	7440020	0.0039
19	Naphthalene	91203	0.0197
19	PAHs (excluding Naphthalene)	1151	0.0362
29	Acetaldehyde	75070	0.7833
30	Acrolein	107028	0.0339
32	Ammonia*	7664417	2.9000
36	Copper	7440508	0.0041
40	Ethyl Benzene	100414	0.0109
44	Hexane	110543	0.0269
46	Hydrogen Chloride	7647010	0.1863
49	Manganese	7439965	0.0031
50	Mercury	7439976	0.0020
64	Selenium	7782492	0.0022
68	Toluene	108883	0.1054
70	Xylenes	1330207	0.0424
72	Diesel exhaust particulates	9901	33.5000

**SOURCE: Turbines**

TAC			
Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.1863
4	1,3-Butadiene	106990	0.2174
5	Cadmium	7440439	0.0015
12	Formaldehyde	50000	1.7261
13	Hexavalent chromium	18540299	0.0001
14	Arsenic	7440382	0.0016
15	Lead	7439921	0.0083
17	Nickel	7440020	0.0039
19	Naphthalene	91203	0.0197
19	PAHs (excluding Naphthalene)	1151	0.0362
29	Acetaldehyde	75070	0.7833
30	Acrolein	107028	0.0339
32	Ammonia*	7664417	2.9000
36	Copper	7440508	0.0041
40	Ethyl Benzene	100414	0.0109
44	Hexane	110543	0.0269
46	Hydrogen Chloride	7647010	0.1863
49	Manganese	7439965	0.0031
50	Mercury	7439976	0.0020
64	Selenium	7782492	0.0022
68	Toluene	108883	0.1054
70	Xylenes	1330207	0.0424

\*This value corresponds to equipment with SNCR, for equipment with SCR substitute listed value by 1.4 lbs/1000 gal, and for equipment without SNCR or SCR by 0.8 lbs/1000 gal.



**Table B-3: DEFAULT EF FOR LPG, BUTANE, OR PROPANE COMBUSTION (LB / 1000 GAL)**

**SOURCE: External Combustion Equipment (Boiler, Oven, Dryer, Furnace, Heater, Afterburner)**

<b>TAC Code</b>	<b>POLLUTANT</b>	<b>CAS NO.</b>	<b>&lt;10 MMBTU/HR</b>	<b>10-100 MMBTU/HR</b>	<b>&gt;100 MMBTU/HR</b>
2	Benzene	71432	0.00071	0.00051	0.00015
12	Formaldehyde	50000	0.00151	0.00109	0.00032
19	PAHs (excluding Naphthalene)	1151	0.00001	0.00001	0.00001
19	Naphthalene	91203	0.00003	0.00003	0.00003
29	Acetaldehyde	75070	0.00038	0.00028	0.00008
30	Acrolein	107028	0.00024	0.00024	0.00007
32	Ammonia	7664417	0.30000	0.30000	0.30000
40	Ethyl benzene	100414	0.00084	0.00061	0.00018
44	Hexane	110543	0.00056	0.00041	0.00012
68	Toluene	108883	0.00325	0.00235	0.00069
70	Xylene	1330207	0.00241	0.00175	0.00051

**SOURCE: Turbine**

<b>TAC Code</b>	<b>POLLUTANT</b>	<b>CAS NO.</b>	<b>ALL SIZES</b>
2	Benzene	71432	0.00109
4	1,3-Butadiene	106990	0.0000389
12	Formaldehyde	50000	0.0643
19	Naphthalene	91203	0.000118
19	PAHs (excluding Naphthalene)	1151	0.0000815
29	Acetaldehyde	75070	0.00362
30	Acrolein	107028	0.000579
32	Ammonia	7664417	0.30000
40	Ethylbenzene	100414	0.00290
62	Propylene oxide	75569	0.00262
68	Toluene	108883	0.0118
70	Xylene	1330207	0.00579

(Continued)

**Table B-3: DEFAULT EF FOR LPG, BUTANE, OR PROPANE COMBUSTION (LB / 1000 GAL)**  
(continued)

**SOURCE: Stationary and Portable Internal Combustion Engines (ICE)**

TAC Code	POLLUTANT	CAS NO.	2 Stroke-Lean Burn	4 Stroke-Lean Burn	4 Stroke-Rich Burn
2	Benzene	71432	0.17757	0.0398	0.143
4	1,3-Butadiene	106990	0.0742	0.0242	0.06
6	Carbon Tetrachloride	56235	0.00549	0.00332	0.0016
9	Ethylene Dibromide	106934	0.00664	0.00401	0.00193
10	1,2-Dichloroethane	107062	0.00382	0.00214	0.00102
12	Formaldehyde	50000	5.00	4.78	1.86
16	Methylene Chloride	75092	0.0133	0.00181	0.00373
19	2-Methylnaphthalene	91576	0.00194	0.003	0
19	Acenaphthene	83329	0.000120	0.000113	0
19	Acenaphthylene	208968	0.000287	0.0005	0
19	Anthracene	120127	0.0000650	0	0
19	Benz(a)anthracene	56553	0.0000304	0	0
19	Benzo(a)pyrene	50328	0.000000514	0	0
19	Benzo(b)fluoranthene	205992	0.000000770	0.000015	0
19	Benzo(e)pyrene	192972	0.00000212	0.0000376	0
19	Benzo(g,h,i)perylene	191242	0.00000224	0.0000375	0
19	Benzo(k)fluoranthene	207089	0.000000386	0	0
19	Chrysene	218019	0.0000608	0.0000627	0
19	Fluoranthene	206440	0.0000327	0.0001	0
19	Fluorene	86737	0.000153	0.000513	0
19	Indeno(1,2,3-c,d)pyrene	193395	0.000000899	0	0
19	Naphthalene	91203	0.00872	0.00673	0.00879
19	Perylene	198550	0.00000045	0	0
19	Phenanthrene	85018	0.000319	0.000941	0
19	Pyrene	129000	0.0000529	0.000123	0
21	Vinyl Chloride	75014	0.00224	0.00135	0.00065
24	1,1,2,2-Tetrachloroethane	79345	0.006	0.00362	0.00229
25	1,1,2-Trichloroethane	79005	0.00477	0.00288	0.00138
26	1,2,4-Trimethylbenzene	95636	0.01	0.00129	0
27	1,2-Dichloropropane	78875	0.00404	0.00243	0.00118
28	1,3-Dichloropropene	542756	0.00396	0.00239	0.00115
29	Acetaldehyde	75070	0.702	0.757	0.252
30	Acrolein	107028	0.704	0.465	0.238
32	Ammonia	7664417	0.30	0.30	0.30
35	Chloroform	67663	0.00426	0.00258	0.00124
40	Ethylbenzene	100414	0.00977	0.00359	0.00224
44	n-Hexane	110543	0.0403	0.10	0
51	Methanol	67561	0.224	0.226	0.277
66	Styrene	100425	0.00496	0.00214	0.00108
68	Toluene	108883	0.0872	0.0369	0.0505
70	Xylene	1330207	0.0243	0.0167	0.0176

Reporting Procedures for AB2588 Facilities Reporting their Quadrennial Air Toxic Emission Inventory in the Annual Emission Reporting Program

**Table B-4: DEFAULT EF FOR GASOLINE COMBUSTION (LB / 1000 GAL)**

**SOURCE: Stationary and Portable Internal Combustion Engines (ICE)**

TAC Code	POLLUTANT	CAS NO.	Non-catalyst (Portable and Stationary)	Catalyst, Portable	Catalyst, Stationary
2	Benzene	71432	3.8061	1.5726	0.1564
4	1,3-Butadiene	106990	0.9183	0.3240	0.0322
12	Formaldehyde	50000	3.4520	1.0131	0.1007
17	Nickel	7440020	0.0033	0.0033	0.0033
19	Naphthalene	91203	0.1438	0.0295	0.0029
26	1,2,4-Trimethylbenzene	95636	1.3941	0.5890	0.0586
29	Acetaldehyde	75070	0.8298	0.1473	0.0146
30	Acrolein	107028	0.1992	0.0825	0.0082
34	Chlorine	7782505	0.4550	0.4550	0.4550
36	Copper	7440508	0.0033	0.0033	0.0033
40	Ethyl benzene	100414	1.6596	0.6420	0.0638
44	Hexane	110543	1.4494	0.9424	0.0937
49	Manganese	7439965	0.0033	0.0033	0.0033
51	Methanol	67561	0.7745	0.2415	0.0240
53	Methyl ethyl ketone - MEK	78933	0.0664	0.0118	0.0012
55	Methyl tert-butyl ether (MTBE)	1634044	2.0579	1.1544	0.1148
66	Styrene	100425	0.1438	0.0707	0.0070
68	Toluene	108883	7.5125	3.5046	0.3485
70	m-Xylene	108383	4.9235	2.1734	0.2161
70	o-Xylene	95476	1.7149	0.7539	0.0750

**Table B-5: EF FOR JET FUEL COMBUSTION (LB / 1000 GAL)**

**SOURCE: Turbine**

TAC Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.9377
4	1,3-Butadiene	106990	0.8563
5	Cadmium	7440439	0.0168
12	Formaldehyde	50000	7.2700
14	Arsenic	7440382	0.1776
15	Lead	7439921	0.1843
17	Nickel	7440020	0.0168
19	Naphthalene	91203	0.2740
29	Acetaldehyde	75070	2.2478
30	Acrolein	107028	1.0961
40	Ethylene benzene	100414	0.0813
64	Selenium	7782492	0.0168
66	Styrene	100425	0.1927
68	Toluene	108883	0.2526
70	Xylene	1330207	0.2312

Reporting Procedures for AB2588 Facilities Reporting their Quadrennial Air Toxic Emission Inventory in  
the Annual Emission Reporting Program

**Table B-6: DEFAULT EF FOR LANDFILL GAS COMBUSTION (LB / MMSCF)**

**SOURCE: External Combustion Equipment (Boiler, Oven, Dryer, Furnace, Heater, Afterburner)**

TAC Code	POLLUTANT	CAS NO.	ALL SIZES
3	Beryllium	7440417	0.0011
5	Cadmium	7440439	0.0067
7	1,2,3,4,5,6,7,8-Octachlorodibenzofuran	39001020	0.00000145
7	1,2,3,4,5,6,7,8-Octachlorodibenzo-p-dioxin	3268879	0.00000145
7	1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562394	0.00000145
7	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822469	0.00000145
7	1,2,3,6,7,8-Hexachlorodibenzofuran	57117449	0.000000727
7	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653857	0.000000727
7	1,2,3,7,8-Pentachlorodibenzofuran	57117416	0.000000727
7	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321764	0.000000727
7	2,3,7,8-Tetrachlorodibenzofuran	51207319	0.000000727
7	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	0.000000727
12	Formaldehyde	50000	0.134
13	Hexavalent chromium	18540299	0.000714
14	Arsenic	7440382	0.00394
15	Lead	7439921	0.00685
17	Nickel	7440020	0.115
19	Acenaphthene	83329	0.000419
19	Acenaphthylene	208968	0.000419
19	Anthracene	120127	0.000419
19	Benzo(a)anthracene	56553	0.000419
19	Benzo(a)pyrene	50328	0.000419
19	Benzo(b)fluoranthene	205992	0.000419
19	Benzo(g,h,i)perylene	191242	0.000419
19	Benzo(k)fluoranthene	207089	0.000419
19	Chrysene	218019	0.000419
19	Dibenz(a,h)anthracene	53703	0.000419
19	Fluoranthene	206440	0.000419
19	Fluorene	86737	0.000419
19	Indeno(1,2,3-cd)pyrene	193395	0.000419
19	Naphthalene	91203	0.259
19	Phenanthrene	85018	0.000419
19	Pyrene	129000	0.000419
32	Ammonia	7664417	2.3500
36	Copper	7440508	0.0111
49	Manganese	7439965	0.3790
50	Mercury	7439976	0.0000786
64	Selenium	7782492	0.000508

(continued)

**Table B-6: DEFAULT EF FOR LANDFILL GAS COMBUSTION (LB / MMSCF)**  
**(continued)**

**SOURCE: Flare, Non-Refinery**

<b>TAC Code</b>	<b>POLLUTANT</b>	<b>CAS NO.</b>	<b>ALL SIZES</b>
2	Benzene	71432	0.159
12	Formaldehyde	50000	1.169
19	Total PAHs (excluding Naphthalene)	1151	0.003
19	Naphthalene	91203	0.011
29	Acetaldehyde	75070	0.043
30	Acrolein	107028	0.010
40	Ethyl benzene	100414	1.444
44	Hexane	110543	0.029
68	Toluene	108883	0.058
70	Xylene	1330207	0.029

**SOURCE: Stationary and Portable Internal Combustion Engines (ICE) and Turbines**

<b>TAC Code</b>	<b>POLLUTANT</b>	<b>CAS NO.</b>	<b>ALL SIZES</b>
2	Benzene	71432	0.00840
6	Carbon tetrachloride	56235	0.000720
16	Methylene chloride	75092	0.000920
18	Perchloroethylene	127184	0.00100
20	Trichloroethylene	79016	0.000760
21	Vinyl chloride	75014	0.000640
35	Chloroform	67663	0.000560
68	Toluene	108883	0.0440
70	Xylenes	1330207	0.0124

**Table B-7: DEFAULT EF FOR DIGESTER GAS COMBUSTION (LB / MMSCF)**

**SOURCE: External Combustion Equipment (Boiler, Oven, Dryer, Furnace, Heater, Afterburner)**

TAC Code	POLLUTANT	CAS NO.	<10 MMBTU/HR	10-100 MMBTU/HR	>100 MMBTU/HR
2	Benzene	71432	0.0080	0.0058	0.0017
12	Formaldehyde	50000	0.0170	0.0123	0.0036
19	Total PAHs (excluding Naphthalene)	1151	0.0001	0.0001	0.0001
19	Naphthalene	91203	0.0003	0.0003	0.0003
29	Acetaldehyde	75070	0.0043	0.0031	0.0009
30	Acrolein	107028	0.0027	0.0027	0.0008
32	Ammonia	7664417	3.2000	3.2000	3.2000
40	Ethyl benzene	100414	0.0095	0.0069	0.0020
44	Hexane	110543	0.0063	0.0046	0.0013
68	Toluene	108883	0.0366	0.0265	0.0078
70	Xylene	1330207	0.0272	0.0197	0.0058

**SOURCE: Flare, Non-Refinery**

TAC Code	POLLUTANT	CAS NO.	ALL SIZES
2	Benzene	71432	0.159
12	Formaldehyde	50000	1.169
19	Total PAHs (excluding Naphthalene)	1151	0.003
19	Naphthalene	91203	0.011
29	Acetaldehyde	75070	0.043
30	Acrolein	107028	0.010
40	Ethyl benzene	100414	1.444
44	Hexane	110543	0.029
68	Toluene	108883	0.058
70	Xylene	1330207	0.029

**SOURCE: Stationary and Portable Internal Combustion Engines (ICE) and Turbines**

TAC Code	POLLUTANT	CAS NO.	ALL SIZES
4	1,3 Butadiene	106990	0.00588
5	Cadmium	7440439	0.000348
6	Carbon tetrachloride	56235	0.0120
10	Ethylene dichloride	107062	0.00900
12	Formaldehyde	50000	0.1140
14	Arsenic	7440382	0.00138
15	Lead	7439921	0.00204
16	Methylene chloride	75092	0.00780
17	Nickel	7440020	0.00120
18	Perchloroethylene	127184	0.0126
20	Trichloroethylene	79016	0.0108
21	Vinyl chloride	75014	0.0216
29	Acetaldehyde	75070	0.0318
32	Ammonia	7664417	3.2000
35	Chloroform	67663	0.0102
57	1,4 Dichlorobenzene	106467	0.0120
64	Selenium	7782492	0.00660

## Appendix C - Default Emission Factors for Plating Operations

Table C-1 lists uncontrolled emission factors for hexavalent chromium (Cr+6), nickel (Ni), cadmium (Cd) and total particulate matter (PM). The factors are provided in pounds per 1000 ampere-hours. Table C-2 lists the certified wetting-agent chemical fume suppressant with usage restrictions to meet 0.01 milligram per ampere-hour limit (or 0.000022 lb/1000 ampere-hr). Table C-3 provides the control efficiencies for various add-on control devices. If your process is controlled with a combination of up to 3 control methods, you are allowed to apply the control efficiency (CE) additively **except for HEPA filter** as follows:

$$\text{Overall CE} = 1 - [(1 - \text{CE}_1) \times (1 - \text{CE}_2) \times (1 - \text{CE}_3)]$$

**The maximum control efficiency for any combination of control methods is 99.97%.** If your process is controlled by more than 3 control methods, please contact the Help Hotline at (909) 396-3660 for assistance. The emission factors and control efficiencies given in Tables C-1, C-2, and C-3 are for reporting emissions under consolidated Annual Emission Reporting program **only**. For permit applications, please consult with permit processing engineers for specific instructions regarding control methods and control efficiencies.

It is expected that many facilities have greater levels of control; therefore, facilities are encouraged to use emission factors specific to their operations. Please be prepared to provide supporting documentation for your emission factors. **If any of your plating processes has a district-approved source test, then use the emission factors developed from the source tests for calculating emissions.**

**Table C-1. Emission Factors for Plating Operations**

TAC/Process	Emission factor (lb/1000 ampere-hr)	
	Toxic Metal	Total PM <sup>[5]</sup>
Uncontrolled hexavalent chromium (Cr <sup>+6</sup> ) plating emission factor <sup>[1]</sup>	0.0097	0.020
Uncontrolled nickel (Ni) plating emission factor <sup>[2]</sup>	0.00051	0.0011
Uncontrolled cadmium (Cd) plating emission factor <sup>[3]</sup>	0.0057	0.012
Uncontrolled Cadmium rotating barrel plating <sup>[4]</sup>	0.000020	0.000041

[1] Estimated from the equation,

$$\text{EF} = 0.505(w)(100 - N)$$

where, EF = emission factor in mg/amp-hr,

w = weight fraction of hexavalent chromium in solution, and

N = plating efficiency in percent

The representative chrome plating bath contains a chromic acid of 32 to 34 oz/gal, which equates to a weight fraction of approximately 10.9%. The assumed plating efficiency is 20%. EF = 4.4 mg/amp-hr = 0.0097 lb/1000 amp-hr.

[2] SCAQMD and Metal Finishers Association of Southern California, 1998 (Source Test No. 98-109 through 111)

[3] AP-42 Table 12.20-4, July 1996.

[4] SCAQMD (Source Test No. 02-0192)

[5] Assumes that 48% of particulate matter consists of the toxic metal. The relationship is derived from Table 12.20-1 of AP-42 dated July 1996 for plating operations with add-on control equipment.

**Table C-2. Certified Wetting-Agent Chemical Fume Suppressants, Companies, and Usage Restrictions for Hexavalent Chromium Electroplating and Chromic Acid Anodizing Operations**

Product	Company	Usage Limitations	Emission factor (lb/1000 ampere-hr)	
			Hexavalent Chromium <sup>[1]</sup>	Total PM <sup>[2]</sup>
Fumetrol 140	Atotech USA	Shall be used at or below 40 dynes/cm	0.000022	0.000045
Fumetrol 140 + Dis-Mist NP	Atotech USA	Both products shall be used in combination at or below 45 dynes/cm. A foam blanket of not less than one inch shall be maintained while plating, with foam blanket coverage of not less than 95% of the tank surface area.	0.000022	0.000045
Benchbrite CR-1800	Benchmark Products	Shall be used at or below 40 dynes/cm	0.000022	0.000045
Zero Mist Liquid R	Enthone, Cookson Electronics	Shall be used at or below 32 dynes/cm	0.000022	0.000045
Clepo Chrome Mist Control 74095	MacDermid	Shall be used at or below 40 dynes/cm	0.000022	0.000045

[1] Assumes 99.77% control efficiency.

[2] Assumes that 48% of particulate matter consists of the toxic metal. The relationship is derived from Table 12.20-1 of AP-42 dated July 1996 for plating operations with add-on control equipment.

**Table C-3. Approved Control Efficiencies for Plating Operations**

Control Method	Control Efficiency (%)
Mist eliminator	50%
Packed Bed Scrubber	70%
Mesh pad	95%
Chemical Fume Suppressants	95-99%
HEPA Filter and Certified Fume Suppressants or others <sup>[1]</sup>	99.97%

[1] Use 99.97% for any combination of HEPA filter and other control methods.

Report the PM emissions on Form B4 or B4U: Choose appropriate Activity Code for your plating operations, list the ampere-hr used during the reporting period in 1000 ampere-hr under throughput (divide ampere-hr by 1000), then calculate your controlled PM emission factor (EF). If specific data is not available for controlled PM emission factor, then use the “Total PM” emission factors in Tables C-1 and C-2 and the control efficiencies given in Table C-3 for any additional control you might have. As stated earlier, the overall control efficiency cannot exceed the HEPA control efficiency of 99.97%. For example, if you are reporting PM controlled emissions for hex. chromium plating using Fumetrol 140 fume suppressant, your controlled default PM emission factor for B4 or B4U would be 0.000045 lb/1000 amp-hr.

Then report your toxic metal (Hex. Chromium or Nickel or Cadmium) emissions on Form TAC by using B4 or B4U emission reference for plating operations, the same throughput used on form B4 or B4U (ampere-hr used during the reporting period in 1000 ampere-hr), the uncontrolled toxic metal emission factor and the Overall Control Efficiency in decimal format, or the controlled default toxic metal emission factor. For example, if you are reporting toxic metal emissions for hex. chromium plating with Fumetrol 140 fume suppressant for Form TAC, the controlled default emission factor for toxic metal would be 0.000022 lb/1000 amp-hr. If you have add-on control devices, use control efficiency in Table C-3, calculate the overall control efficiency from the above equation and list it under “Overall Control Efficiency” field.



## Appendix D – Emission Factors for Spray Coating Operations

$$\text{Overall control efficiency} = 1 - [(1 - \text{TE}) \times (1 - \text{FCE})]$$

where: TE = transfer efficiency

FCE = filter control efficiency

$$\text{Transfer efficiency} = 0.65$$

### Filter control efficiency

Conventional Filters: 0.90

Three-stage Aerospace NESHAP-compliant filters: 0.95

HEPA Filter: 0.9997 (The HEPA filters used shall be individually dioctyl phthalate [DOP] tested with 0.3 micron particles and certified to have an efficiency of not less than 0.9997.)

Supporting documentation from the manufacturer of filters used should be saved and must be made available upon request. **If a multi-stage filtration system is used, the overall control efficiency for the filtration system shall be the highest control efficiency for the smallest particle size (efficiency of the last stage). Typically, a fall-out factor is not allowed unless it is evaluated by the District staff and conditions are included in permits.**

### Hexavalent chromium weight fractions for various compounds:

Barium chromate ( $\text{BaCrO}_4$ ; CAS # 10294403) – 0.2053

Calcium chromate ( $\text{CaCrO}_4$ ; CAS # 13765190) – 0.3332

Lead chromate ( $\text{PbCrO}_4$ ; CAS # 7758946) – 0.1609

Sodium chromate ( $\text{Na}_2\text{CrO}_4$ ; CAS # 7775113) – 0.3210

Sodium dichromate ( $\text{Na}_2\text{Cr}_2\text{O}_7$ ; CAS # 10588019) – 0.3970

Strontium chromate ( $\text{SrCrO}_4$ ; CAS # 7789062) – 0.2554

Zinc chromate ( $\text{ZnCrO}_4$ ; CAS # 13530659) – 0.2867

**If you need assistance with other compounds, please refer to Table A-2 of Appendix A or contact the District staff.**

**Example:** A facility used 3 gal/yr of primer containing 30% strontium chromate ( $\text{SrCrO}_4$ ) in a spray booth with conventional filters.

The density of the primer is 6 lb/gal.

The hexavalent chromium weight fraction in strontium chromate is 0.2554.

$$\begin{aligned}\text{Overall control efficiency} &= 1 - [(1 - \text{TE}) \times (1 - \text{FCE})] \\ &= 1 - [(1 - 0.65) \times (1 - 0.90)] \\ &= 0.965\end{aligned}$$

Hexavalent chromium content per gallon of primer = 6 lb/gal x 0.30 x 0.2554 = 0.4597 lb/gal

Emissions of hexavalent chromium = 3 gal/yr x 0.4597 lb/gal x (1 – 0.965)  
= 0.04827 lb/yr

For particulate matter (PM) emissions, use procedures described in the “Guidelines for Particulate Matter Emission Calculations for Spray Coating Operations”.

## **Appendix E – Emission Factors for Asbestos Abatement (Demolition)**

### **PM and asbestos emissions from asbestos abatement operations:**

If site specific data is not available, you can use the following default emission factors for PM and asbestos emission calculations resulting from a demolition/renovation (asbestos abatement) operation:

First report the PM emissions on Form B4: Choose the Activity Code “44- Asbestos abatement”, list the amount of the building material removed in tons under the throughput, and use the following controlled default emission factor (HEPA filter efficiency is already built into the listed emission factor):

**PM:      emission factor = 0.006 lb/ton of building material removed**

Next, report the Asbestos emissions on Form TAC by using B4 emission reference for asbestos abatement, the same throughput used on form B4 (tons of building material removed) and the following controlled default emission factor (HEPA filter efficiency is already built in the listed emission factor). Since the control is accounted for in the emission factor, list “0.00” under the Overall Control Efficiency:

**Asbestos:      emission factor = 0.0015 lb/ton of building material removed**

#### **Assumptions used in determining default emission factors:**

- All operations controlled by HEPA filter with 99.97% efficiency
- PM airborne factor = 1% (AQMD)
- Average asbestos debris concentration = 25% (EPA)